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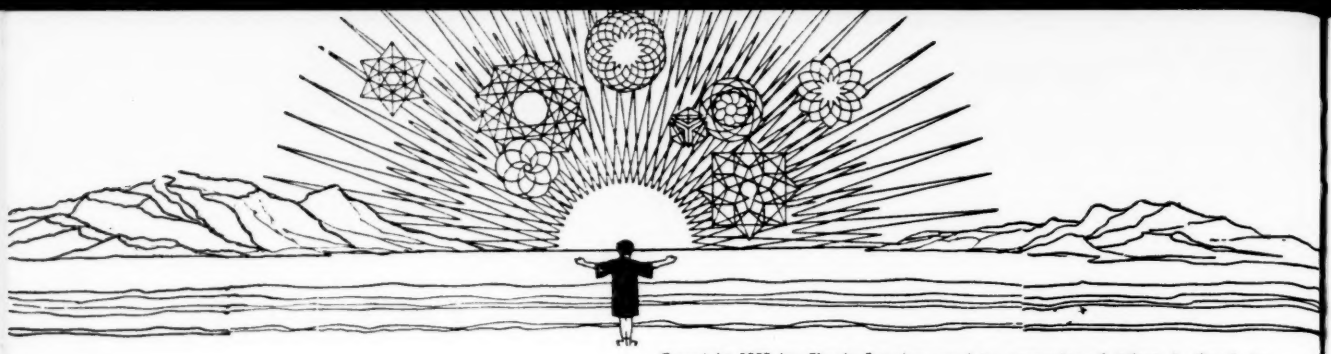

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MAIN CURRENTS
IN MODERN THOUGHT

A cooperative journal to promote the free association of those working toward the integration of all knowledge through the study of the whole of things, Nature, Man, and Society, assuming the universe to be one, dependable, intelligible, harmonious.

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On the cover: Buddha. Sarnath School, Gupta period. Courtesy of Mr. S. Mukerji, Information Service of India.

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MAIN CURRENTS IN MODERN THOUGHT is published to call attention to significant contributions to learning currently being made in the multiple fields, relating these advances to each other and to classical and contemporary views of Eastern, European and American thinkers. It is designed to save time for the reader by providing a vantage-ground from which the whole world of knowledge may be surveyed and kept in proportion as it moves toward integration. Its editors assume that the principles of art, the universals of philosophy, the laws of Nature and Man as formulated by science, and the truths of comparative religion, can be orchestrated into a harmonic, meaningful, ethical body of teachings which can and should be made the central core of curricular study in the educative process at all levels. Contributors to MAIN CURRENTS enjoy full liberty of opinion and expression in these pages.

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NIRVANA: EXTINCTION OR FULFILLMENT

G. P. Malalasekara

A Discussion of One of the Principal Teachings of Buddhism

THERE is today throughout the world, both in the East and in the West, a great resurgence of Buddhism.

I was recently in China, in April and May 1959. I went there primarily because I wanted to find out what was happening to Buddhism in that great country, since there have been so many rumors of the disabilities which religion has suffered under the new regime. It happens that I have several reasons for my interest and concern. I am myself the ambassador for Ceylon in the Soviet Union, and during my stay in that country I have particularly tried to find out whether Buddhism has taken any sort of foothold. This effort on my part is in a sense an outgrowth of my work for an organization called the World Fellowship of Buddhists, which was inaugurated in Ceylon in 1950. As the name indicates, the purpose of this body is to bring together the various sects and schools of Buddhism which are scattered about the world. There are today something like 550 million people who call themselves Buddhists. It is therefore significant and important for the rest of the world to examine and understand the philosophy which motivates so large a proportion—almost one-fifth—of the human race. For all of us have some kind of philosophy which guides our actions. If the philosophy is such as to promote peace and harmony, good fellowship and friendship in the world, then the action which results will aim at goodwill and peace and harmony and therefore happiness. If the philosophy is such that it promotes discord and disharmony, then the opposite will result.

This is why I was particularly happy to see that both in China and in the Soviet Union, contrary to popular belief, there is a great deal of interest in religion. It might perhaps surprise you to learn that in the Soviet Union there are something like 75,000 Buddhists. Buddhism comes to the Soviet Union from Tibet, and their monks are also known as lamas, as in Tibet, rather than as bhikkhus as in other Buddhist countries. There are many lamas in the Soviet Union and many active institutions, and it may be said with justice that in that country Buddhism is a living force. Perhaps one incident in my own experience will illustrate this.

Back in the last century, the Academy of Sciences in what was then known as St. Petersburg, now Leningrad, published a series of books called the *Bibliotheque Buddhica,* that is, Buddhist texts which were translated into English and Russian, with accompanying studies in Buddhism. Two of the best known volumes in this series are concerned with Buddhist logic, and were the work of a famous scholar, Schterbasky. Publication of the *Bibliotheque Buddhica* ceased after 1917, but proposals are now afoot to resume their issuance, which is evidence that there is a resurgence of interest and a desire to make the teachings of the Buddha known, not only in the Soviet Union but in other countries which these publications reach. I had the privilege, myself, of giving several courses of lectures on Buddhism under the auspices of the Academy of Sciences in Moscow. I am glad to be able to say that they were well attended, that many searching and intelligent questions were asked, and that the audience evinced great interest in the subject. Soon after my arrival in Moscow I offered to give instruction in Pali, the language of the old Buddhist scriptures. The offer was warmly received, and up to the time I left for New York in the fall of 1959 to attend the sessions of the United Nations I was teaching a class in Pali, and therefore in Buddhism, in the Oriental Institute of the Academy of Sciences.

As for China, before I went there I was told that religious practices as a whole were frowned upon, that the activities of religious institutions were being greatly curtailed, if not entirely suppressed, and that monks were forbidden to carry on their work. In spite of this, my trip to China was the result of an invitation of a state-sponsored organization called the Buddhist Association of Peking, and as their guest I was given every facility to visit many parts of China, including Shanghai, Nanking, Suchu, Hanchow and Peking. At an institution called the Buddhist Academy I found that Tibetan, Chinese, Japanese, Sanscrit

and Pali were all taught, that the study of Buddhist scriptures and the training of monks and nuns were going forward. The important Buddhist monasteries have been taken under state patronage and state funds are being spent for their restoration and preservation, monks are allowed to carry on their work unhampered, and several publications both in Chinese and in other languages are being issued regularly. This fact is of special significance because the population of China is some six hundred and eighty million people, the majority of whom traditionally call themselves Buddhist. There are also numerous followers of Confucius and of Lao-tse, whose teachings are in many ways similar to the tenets of Buddhism. Indeed, when a Chinese goes into his temple for worship, he will light three incense sticks for these great teachers whom he reveres. Thus Buddhism remains of continuing importance in China since the revolution, and interest in it has not flagged.

Indeed I find this interest in Buddhism wherever I go. In the United States, too, on this visit as on others, people continually ask me about Buddhism and show their concern to know what Buddhism has to say to the modern world. I find it greatly encouraging also that so many books and articles on Buddhism are published in this country, although it is a pity that many of these publications have been written not out of the Buddhist background, but by people who have come to it from other traditions, from a study of comparative religion, and so on. For this reason, in the West Buddhism is often not fully interpreted against the centuries of culture which it has so largely shaped, and therefore something of its total influence and meaning remains unrealized.

TO all those who put the question, "Has the Buddha any message that can be of use to the modern world?", I have one answer. The Buddha stated that his teachings were timeless, that they were true, that they were effective for all peoples in all places.

Perhaps I can amplify this statement. When we Buddhists go to our temples for worship, we utter three formulas of adoration. One of these deals with the Buddha himself, with his personal qualities as teacher, as sage, as guide, philosopher and friend of mankind. Our worship consists not in prayer but in the hope that by striving to practice those qualities in our own lives we too may acquire those virtues which the Buddha embodied. So we hold the Buddha before our minds as an exemplar, and we show our respect to him by lighting a lamp, offering flowers and burning incense. In the formula which is uttered last, we enunciate the qualities that should be found in a follower of the Buddha, in order that he may in the end reach the goal of nirvana.

But it is the second of these formulas which I should like to speak of especially: an expression of the qualities of the Buddha's own teaching. In Ceylon this formula, like the others, is stated in Pali:

Svakkhato Bhagavata dhammo sanditthiko akaliko ehipassiko opanaiko paccattam veditabbo vinnuhiti.

Translated, this means that we honor the Buddha's teaching, first, because it is plainly stated; it contains nothing hidden or esoteric. Just as the palm of one's hand can be clearly seen and understood, so are the Buddha's teachings plain, explicable, understandable. This established a tradition quite different from the custom of teaching in ancient India called *guru musthi.* This term indicated that there was something which the teacher held in reserve, as in his closed fist, because he felt that if the pupil were told everything, he might lose respect for the teacher, or he might not understand it. Therefore the knowledge had to be given in small doses. The teaching of the Buddha was not of this kind; the whole was there for all to see.

That is the first characteristic of the Buddha's teaching. The second is that it is *sanditthika,* that is, its efficacy is direct and immediate. "Is it a good thing," the Buddha asked, "to show greed?" The answer comes at once: "No, it is not a good thing to be greedy." "Is it a good thing to practice anger and ill-will and hatred?" "No, it is not a good thing to show anger and ill-will and hatred." "Therefore," the Buddha would say, "Do not have greed or ill-will or hatred or anger in your hearts because, as you yourself admit, it is a bad thing." "Is it a good thing to practice compassion and friendliness and good will to everybody?" The answer comes immediately, "Yes, it is a good thing." And then the Buddha says, "Therefore practice good will and compassion and sympathy." The efficacy of the Buddha's teaching can be shown, it can be demonstrated at once. It is self-evident.

The Buddha's teaching is, as I mentioned, *akalike;* it is timeless and universal; it is true for all places and all people. It is also *ehipassika,* that is, it is the come-and-see doctrine. The Buddha's teaching invites investigation; it is not something to be accepted and believed on faith or authority. Rather, the seeker is asked to examine the teaching for himself, to consider it in all its details, and then accept it or reject it. Acceptance by the individual is predicated only upon his own conviction that the teaching is meaningful and valid for him. This is the proper basis for acceptance. Once a group of men told the Buddha, "There are many wise men who try to convert us to their points of view, which are often contradictory and in conflict with one another. What are we to do

in such cases?" The Buddha said, "The only thing you can do is to examine what each man says and accept what you think is reasonable and correct. But when you feel you cannot accept something, do not condemn it outright. Never say, 'I do not accept this, and therefore it cannot be right.' That is not the path of wisdom. Put it by, saying, 'I do not understand this thing and therefore it is not for me, but perhaps I shall come back to it later.' In this way no idea is rejected arbitrarily."

The teaching of the Buddha is also *paccattam veditabbo;* it must be realized by each man for himself. It is also *opanaika,* i.e., it has a definite goal. The goal which the Buddha set for himself and for every man is the discovery of truth. And what is truth? He defined truth as that which is as it is. When we understand truth, then we see things as they really are, then we possess knowledge of what is—not as what we would like it to be, not as other people say things are, but reality as it is. And this reality has to be appreciated by each man for himself. It is like the curing of a disease. If I am ill, I go to a physician. The physician diagnoses my ailment and gives me a prescription for its cure. I take this prescription to a chemist, have it made up, and then *I* must drink the medicine. It is not enough for the physician to be clever and to understand my difficulty. I can never be cured by singing his praises and saying what a wonderful man he is, or holding festivals in his honor, or trying to persuade others that he is the one they should consult. None of this would cure my disease. Nor is it enough for me to accept his written prescription, put it in a casket, place it on the back of an elephant and carry it in a procession to the accompaniment of music and dancing. That is not going to cure my disease either. Nor is it enough for me to obtain the medicine from the chemist, put it on a shelf and place before it a vase of flowers, burn incense and light candles to it, and say, "How wonderful is this prescription given by a great and wise physician, may my disease thereby be cured." That is not enough. Nor is it enough for my wife, anxious to spare me trouble, to say, "This man, my husband, has been sick; he is old and feeble and weak and it is very unpleasant for him to take this bitter medicine. Therefore I will swallow it for him." None of these things will cure me. I myself must make the effort and swallow the medicine. I must follow the directions given with regard to my diet and conduct. Then it is that I will be cured, and when at last I have become whole and healthy, I shall have done it myself, by my own action.

It is the same with the realization of truth, that is to say, the attainment of nirvana. Each must achieve it for himself. But the Buddha qualifies this statement: the realization of truth is possible only for the wise. That is why the teaching is called Buddhism; it is designed to attain *bodhi,* or wisdom. And what is wisdom? It is awakening. And what is awakening? It is the realization of the truth. It is nirvana.

WHEN the Buddha was asked to define nirvana he gave his answers in many different ways to suit the capacities and the temperaments of his hearers. But one of the commonest answers he gave was that nirvana is the attainment of *bodhi,* and *bodhi* is enlightenment.

The Buddha is unlike other religious teachers, in that he did not make any claims to personal uniqueness. Rather, in calling himself the Awakened One, he spoke of himself as a pioneer whose task was to discover the way to enlightenment and to point it out for others to follow. He said that he did not create this way, he only rediscovered it. This is the ancient road which has been trodden for thousands of years by countless men and women in their unending search for enlightenment, and others before him achieved their goal of nirvana and became Buddhas. Just so, also, many who follow after the Buddha will so achieve.

But for the task of winning enlightenment, wisdom is necessary.

The opposite of wisdom is folly or ignorance, and according to Buddhism, this ignorance is the root cause of all unhappiness, of all sorrow, of all misery. Therefore, for happiness wisdom is necessary. That is why Buddhism became the religion of enlightenment, and that is why Buddhism encourages men to pursue all the ways that they can find for the acquisition and development of wisdom. Throughout the history of Buddhism, wherever the teachings have spread, every possible encouragement has been extended to fostering all the ways of knowing that would deepen and broaden men's minds, that would make them learned and wise, skillful and accomplished. To be wise one must have skills, and skills are acquired by practice. If the skills are good and the practices are good, then wisdom will follow. That is why in Buddhism the word for good is *kusala,* which means skill, and the word for evil is *a-kusala,* which means lack of skill. If one wants to acquire wisdom and attain nirvana, one must cultivate skills—those things that make the attainment possible. Herein resides the ethics of Buddhism, which enunciates the skills whose attainment leads to the goal of enlightenment.

How did the Buddha discover these things? Those who have read his life will remember how, as he sat at the foot of the bodhi tree, enlightenment came to him. The story is an interesting one, which the Buddha has given in his own words. He said, "As I sat there on the last watch

of the night in the month of the full moon of May —the month when all nature is beautiful — the moon shone bright in the blue sky and all was still, for the whole world was awaiting this great event which it had expected for centuries. Knowledge appeared in me, the eye of wisdom appeared in me, light appeared in me, vision appeared in me." It is important to note that knowledge and wisdom came to him as a revelation; he did not seek out and discover them. Like all other religions, Buddhism is a religion of revelation. Knowledge and wisdom were *revealed* to the Buddha in his mind's eye. "The eye of knowledge and wisdom arose within me like the waters of a spring bubbling from inside the bowels of the earth and rising to the surface." In Buddhism, nirvana therefore comes as a revelation. But in order for this revelation to appear, a certain state of mind has to be cultivated and attained. This wisdom, *bodhi,* comes as what might be described as a vision of transparency. Just as in a mountain pool of crystal water shells and pebbles on the bottom are to be seen, and the fish floating in the water, and the plants that grow therein appear through the limpidness and clarity of the water, so in the transparency of the awakened mind the facets of truth are perceived. Knowledge comes not through its *pursuit,* but as a revelation, of things discovering themselves in the mind. This does not mean, however, that the knowledge can come without effort. The effort is very necessary, but it exists only in the preliminary stages. When nirvana is actually attained, all effort has ceased.

Why is the effort necessary, then? In order to produce that condition of limpidity, of transparency of the mind, so that the enlightenment may arise within it. Such a condition cannot be won without effort. And a major concern of Buddhist ethics is the establishment of a technique, of rules to be followed which will gradually lead the mind to this sought-for state of limpidity.

BUDDHISM is often described as a path that one takes. Following the way of Buddhism is like taking a path that leads to the top of a mountain. There are many stages on this journey; some are easy and wind through the plains and along gentle slopes, and others become harder and lead through steep and narrow passes. The end of the climb becomes very difficult indeed.

The first stage on the way is called *pancasila.* It comprises the famous five precepts which every Buddhist is expected to observe faithfully all the days of his life. Briefly stated, the five precepts consist, first, of acknowledgment of the sanctity of life; second, of respect for the rights of property; third, of moderation and control of the appetites; fourth, of observance of the canons of truth in one's speech, and fifth, of abstinence from drugs, drink and all things that cloud the reasoning and judgment. These are the basic or elementary precepts. They have their positive aspects as well, of course. It is not enough merely to refrain from taking life; you must also actively encourage and help all forms of life to progress, to find their life's goal. Again, while you refrain from taking away that which belongs to another without his consent, you also give generously to others, helping them to attain more valuable possessions, those which are not fleeting and temporary but are of lasting benefit. And just as you abstain from indulgence in things which increase the appetites, you actively renounce the appetites as much as possible, realizing that among the many fetters which bind the aspirant and prevent him from attaining liberation one of the most powerful is attachment to desire of all kinds. The desire of sex, potent as it is, will be in time eliminated, for the spiritually developed man carries within himself the element of self-completion. The longing for self-fulfillment which every person has is usually sought rather confusedly with members of the opposite sex, but for this kind of completion the spiritually awakened one has no need. Again, just as the seeker will refrain from false speech, so also will he encourage others to extend their appreciation and understanding of the truth. Just as he avoids harsh speech himself, he will try to say things which have positive value to others. And just as he avoids intoxicants which cloud understanding, so he will actively try to strengthen the power of his understanding and gain the wisdom to perceive the truth wherever he find it.

These preliminary disciplines are necessary because the Buddha says that one of the fundamental causes of unhappiness in life is disharmony. This disharmony is not primarily the result of the conflicts between people—between myself and another. All of us who are thoughtful about the problems which face man feel that life is a constant struggle wherein each seeks to overcome the difficulties of getting what he wants. Since so few succeed completely, life is very largely a matter of frustration, disappointment, sorrow and despair. On the other hand, we constantly carry on all sorts of activities which increase the scope and the variety of our desires. So that we have a closed spiral of conflict between ever-increasing desires on the one hand and ever-unsatisfied fulfillment of desire on the other. This human condition is actually the basis of the world economic system, of trade, and of material prosperity. Businessmen try to create desires on the one hand, and find methods of satisfying those desires on the other. And what is more, life as we all live it is a parasitical process. In order that we may continue to live, we feed upon each other—not necessarily physically. In order that I may eat, hundreds of people labor to produce my food. In order that

I may be dressed, hundreds work to produce my clothes. Hundreds more provide me with transportation, services, entertainment. So there is a constant process of life feeding upon itself.

Apart from this external situation, there is another conflict which occurs within ourselves, rooted in our own desires and their satisfaction. The Buddha said this interior conflict, which he called *dukkha,* is the real cause of unhappiness. In many books about Buddhism this term is translated as sorrow and suffering, words which do not convey the full meaning. *Dukkha* implies much more than the sorrow and suffering brought on by old age, disease and death, by disappointment and frustration. It signifies conflict, discord, disharmony. The Buddha said that in order to find happiness, this discord must be ended, and the ending of that discord needs self-discipline. When we are completely disciplined, then there is no conflict in our minds. We all have desires, it is true, but it is not the desire itself that is evil, it is rather the enslavement of oneself to desire that is evil and productive of unhappiness. If we can understand and transcend our desires, to that extent our happiness will be increased.

The highest form of achievement, according to the Buddha, is self-mastery. Possessions are not bad if they are wisely used. Actions are not bad if they are controlled and directed. What is wanted is not inaction but renunciation of wrong action. The ordinary man is acted upon by others, by forces extraneous to himself, but when he has achieved self-mastery, then his action is self-engendered and self-directed. Therefore, discipline is necessary in order to bring about self-mastery.

THE practice of these disciplines in time brings us to a state of mind which is described by the Buddha as *samadhi* or equanimity, that is, equilibrium of the mind. We are then able to look upon the world with a steady eye. When we have achieved this equanimity we are in a position to direct our attention to truth, and then there arises in our mind what the Buddha called *vipassana,* clear sight, or *dassana,* insight—that is, *panna,* the knowledge of things as they are. This insight cannot arise in a mind which is tossed and tumbled from one side to another by emotions and desire. It is only when the mind becomes steady that it can direct itself to the truth. It is at first as though we sought to see by fixing a searchlight to a boat on the ocean. But the boat is tossed about and we cannot direct the searchlight where we will. When, on the other hand, the searchlight is fastened to a rock, then we can direct its beams as we choose and, depending upon the power of the light, we can see clearly and at a distance. If the strength of the light then can be increased, the light will reveal more. Thus, with equanimity, the mind can be cultivated and strengthened, so that our vision may have greater scope.

Herein we see the necessity of living more than one life. Generally speaking, it is not possible for a person to develop all the qualities of head and heart, all the strength of mind necessary for a full vision of the truth, in one life. Therefore, as a corollary to the teachings of Buddhism there is the doctrine of repeated births. But at the same time, the Buddha says that nirvana should not be something which one feels can be postponed for a future life, because if one has the requisite energy and purpose, and the necessary qualifications, truth can be realized immediately, in this life. More than any other religious teacher, the Buddha laid great emphasis upon the necessity of using this present moment, which we are now experiencing and over which we have control, to acquire truth as far as we possibly can, even if it is not complete truth. This life, this world, is what is available to us. Let us therefore make the best use of it. Nirvana is something, the Buddha said, which can be attained here and now. Other religions teach that paradise, bliss, wisdom, are to be found after death. If you want to go to heaven, you must first of all die. However, the Buddha and his followers, the *arhats,* attained nirvana, which is perfection, while on earth. If you and I, too, can achieve perfection in this life, then nirvana will come to us.

You will note that I have given several definitions of nirvana. The most usual translation is enlightenment or awakening, *bodhi.* But other definitions can help us to understand its nature. For instance, the question is often put, "Is nirvana extinction or fulfillment?" When I am asked that question, I say it is both. The word itself is composed of *vana,* craving, and *nir,* extinction. Nirvana is a state wherein the conflict which is the result of craving no longer exists. In this sense it means extinction—of craving, of conflict. But nirvana is also fulfillment, in the sense that it represents the perfection of all those qualities which lead us to happiness—qualities of discipline, of wisdom, of knowledge, and of freedom.

Nirvana is essentially absolute freedom. The man who has attained it is free from conflict, from the enslavement of desire, free from subjugation by others, free of the domination of outside events and forces. He has found self-fulfillment; he is his own master. He is at peace because the causes of craving, the thirst for things, the feeling of unsatisfied desire, are all gone from him. He understands desire, and is not frightened by it. He is also free of fear, because he understands the nature of time and of temporality. To most of us, time is a frightening thing, because, as one of our proverbs says, once lost it can never be regained. So we are very frightened of losing it. One of the aspects of nirvana is that the person who achieves it realizes that time is relative to

the events of a person's life, that it has no reality in itself. Therefore he no longer fears it, or is a slave to it. The fear of death goes too. The person who attains is not himself free from death, because so long as a man is alive, he is also dying. We are being born and we die every moment of our lives. But we are afraid of death, and that is why we do everything we can to postpone it. But when a man attains enlightenment he understands the nature of death and it holds no fear for him. Thus freedom from all these fears is also an aspect of nirvana.

WHY do I give you the negative aspect of nirvana, as freedom from this and that? Has nirvana any positive aspects as well? To this I answer most emphatically, yes. Most Western books about Buddhism represents nirvana as extinction or annihilation of life. Once, when I was on a visit to this country, I was asked by a university to give a lecture under the auspices of an endowment which requires that the lecturer talk about immortality. My subject was to be the Buddhist concept of immortality, but the dean who issued the invitation doubted the feasibility of such a topic, since he understood that Buddhism taught annihilation. When I enquired where he got such an idea, he said, from reading Albert Schweitzer. This is true. Dr. Schweitzer, himself a man of great wisdom, has written that he considers Buddhism one of the most profound systems of ethics ever promulgated, but that these ethics lead man only to the goal of nothingness, to the bleak annihilation of nirvana. Therefore, while the dean was eager for me to talk about Buddhism, he felt that perhaps this would not fulfill the terms of the endowment. However, I reassured him to the extent that the lecture went forward as scheduled. When I began, I said at once that I knew the terms under which the lecture was to be given, and that I had no intention of deceiving my audience. For Buddhism does teach immortality, and the proof resides in the very first utterance which the Buddha made after his enlightenment, when he had made up his mind to promulgate the truth he had discovered. In his own words:

> Aparata te amatassa dvara
> Je sotavanto pamuncantu saddham

"Wide open are the doors of *immortality*. Let those who have ears listen and put forth effort to obtain that immortality."

Buddhism therefore does teach of immortality, but what is the nature of that immortality? This question leads to another: What happens to the person who attains nirvana *after* his death? If the Buddha's words are to be believed, he becomes "immortal." The Buddha was asked whether it would be correct to say of people who died after they attained nirvana that they go on living. He replied, no. Would it then be correct to say that they are dead? Again the Buddha said, no. Edwin Arnold tried to express this paradox in the *Light of Asia* when he wrote, "If any say nirvana is to live, say unto them they err. If any say nirvana is to die, say unto them they lie." Nirvana is neither life nor death; it is beyond both. It is a state beyond, in which the processes that bring about life have ceased. For the seeds of life are in death, and death is present in the living. The Buddha says that the continuity of life exists because of the presence in us of an element which he described as *upadana,* a grasping, a reaching out. Life goes on because there is a constant craving or thirst for life, a will to live. But when a person reaches nirvana, the thirst for life is quenched forever. Therefore, it is wrong to talk of nirvana in the terms in which we speak about life as we know it. Because nirvana is beyond death, there is no extinction.

THEN what is nirvana? The answer has to be as the Buddha gave it. Nirvana is indescribable, because it is infinite, and definition is possible only of finite things. Nirvana has to be experienced in order to be understood. It is not possible to say what nirvana is, we can only say what it is not. Therefore it is described in vague, inconclusive and indefinite terms. The Buddha explained this in a parable about the blind men and the elephant. Several blind men encountered an elephant, and they tried to discover what he was like by touching various parts of his body. One man who felt his side said the elephant was like a wall. Another who touched his leg said the elephant was like a pillar. Another touched his ear and said it was like a blowing fan. Another touched his tail and said it was like sugar cane. Since each blind man only knew one aspect of the elephant, nobody really knew him as he really was. Similarly, it is not possible to describe nirvana by defining its aspects.

We have in our folklore a little poem which points this out. It tells of a dumb man who had a conch shell. One day he met a man who was deaf, but he didn't know of his affliction. So, hoping to get a few pennies, he started blowing on the conch shell. But of course the deaf man didn't hear a sound. The man who was blowing the conch shell could not understand why the deaf man did not show any appreciation of his music. Although he blew his best tunes, the deaf man remained unmoved. But after watching the man playing the conch shell for some time, the deaf man finally said, "Friend, what you have there in your hand must be something tasty and good to eat, because I see you putting it in your mouth, so please let me also have a suck." You cannot explain sound to a deaf man, nor light to the blind.

A man who has never tasted sugar does not understand what sweetness is. It is the same with nirvana. The experience alone gives understanding.

This may seem very unsatisfactory to you. But the Buddha encourages us by saying that it is possible to get glimpses of nirvana. As we progress along the path toward enlightenment, we shall come to realize gradually what perfection can mean; we shall experience a glimpse of nirvana. That is the only assurance which the Buddha held out to us, that, and his own example. We Buddhists have been taught that it does not matter if the word of the Buddha with regard to nirvana is satisfying or not. What is important is that we who have followed the path of the Buddha have thereby found great joy. We have found that the teaching of the Buddha is effective in this present world, in this present existence. That is what counts. And it holds within it the hope of perfection for all men. For 2500 years people who have observed and practiced the teachings of the Buddha have found a certain degree of peace and harmony and happiness thereby, a sense of understanding, of acceptance of things as they are, which has helped them in the solution of their own problems. Of course the solutions have not been completely satisfactory, because our practice has not been perfect, but we recognize the fault as our own.

We also feel that we who are the custodians of this teaching have a duty to make it known to other people. It is for us to invite them, as the Buddha did, to examine these teachings for themselves. The Buddha said, come and look. If you will look you will find, I am sure, that in these teachings there is something which can be of great practical benefit and use in the world today, where people live in terrible conflict. In these times desires are being piled one upon the other, and countless attempts to satisfy these desires are being made. But there is never a sense of fulfillment, only a greater longing and yearning and craving—what the Buddha described as the eternal insufficiency of satisfaction, the unsated thirst. Thus it is that to this modern world of conflict the Buddha's teachings can provide a haven of comfort and consolation.

Therefore, I ask, examine these teachings and see whether they can be of use to you. And if you find them to be of use, practice them, and through the practice, begin to find happiness and peace in your own life.

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THREE BASIC TRENDS OF OUR TIMES

Pitirim A. Sorokin

The Factors Which Are Creating a New World Culture

PART I

THE three greatest trends of our time are: *first*, a shift of the creative leadership of mankind from Europe and the West, where it has been centered for the last five centuries, to a wider area of the Pacific and the Atlantic, particularly the Americas, Asia and Africa; *second*, a continued disintegration of the hitherto dominant Sensate man, culture, society and system of values; *third*, the emergence and slow growth of the first components of a new, Integral, dominant order, system of values, and type of personality.

The Shift of Creative Leadership

WE all know that creative leadership, both on a small and a large scale, shifts in the course of time from place to place, group to group, country to country. Thus, in the days of W. James, J. Royce, Pierce, Palmer and Munsterberg, the Harvard department of philosophy certainly led all others in American universities. With the passing of these men, Harvard lost this role and the leadership moved elsewhere. The same thing applies to other kinds of leadership. Some seventy years ago New England was the center of the textile and other industries in the United States. Later on the center moved to other regions of the country. On a larger scale, in the period from 800 to 1600 Italy produced 25 to 41 percent of European scientific discoveries and inventions; in the period since 1726 its share has dwindled to from 2 to 4 percent. The United States contributed only 1.1 percent of the total inventions in the period of 1726-1750; this share increased to 25.3 percent from 1900 to 1908, and it is now still greater.

History tells us that at one time the center of political power was in Egypt; at others it shifted, now to Babylon or Persia, now to India or China, now to Rome or Europe, and within Europe it continued to shift from nation to nation. Likewise, the great centers of musical creativity in Europe were at one period in Sparta, then in Rome and Milan, then in Italy and France, the Netherlands and England, Austria and Germany, and finally, in Russia, Norway, Finland and the United States. For the last ten centuries, western economic power was centered in Spain, Portugal and Italy, then in the Netherlands, France, England, Austria, Germany, and now in the United States and Russia.

We all know that up to the fourteenth century, roughly, the creative leadership of mankind centered in the peoples and nations of Asia and Africa. While the West was still very primitive, the great civilizations in Africa and Asia — the Egyptian, the Babylonic, the Iranic, the Summerian, the Hittite, the Hindu, the Chinese, the Meditarranian and others—emerged and fluctuated in growth and decline for millenia.

The Western or Euro-American peoples were the last to assume the creative leadership. During the last five or six centuries they discharged their creative mission brilliantly, especially in the fields of science, technology, Sensate fine arts, politics and economics. At the present time, however, the European monopoly of leadership can be considered about ended. The history of mankind will be increasingly staged on the larger scene of the Asiatic-African-American-European theater. The epochal shift is already under way. It has manifested itself in the dissolution of the great European empires, in the decreasing political and cultural influence of Europe, and in the shift of creativity of several European nations to other continents—the Anglo-Saxon to the United States, Canada and Australia; the Spanish and Portuguese to Latin America; in the Soviet Union, the growth of Asiatic Russia. A still stronger manifestation of this shift is the unquestionable renaissance of the great cultures of Asia and Africa, which has shown itself in the growth of their political and social independence and of their influence in international affairs, in their rapid scientific and technological development, and in the diffusion of their religious, philosophical, ethical, artistic and cultural values in the Western world.

All these and a legion of other evidence make the fact of the shift of the creative leadership of mankind away from Europe fairly certain. It is pregnant with momentous changes in all cultures

and in the social life of all nations. Its effects upon the future history of man are going to be incomparably great. Such is the first basic sociocultural trend of the last few decades.

Sensate Ideational and Integral Sociocultural Orders

THE other two trends—a continued decay of the Sensate sociocultural system of the West, and the emergence of a new Integral order—are possibly of still more importance for mankind. In order to unfold the meaning of these statements I must make a short explanation.

Some thirty years ago I ventured upon a detailed diagnosis of the state of Western culture and made many a forecast of war, revolution and human misery. Summarized, this diagnosis ran as follows:

"Every important aspect of the life, organization and culture of Western society is in the extraordinary crisis. . . . We are seemingly between two epochs: the dying Sensate [secular] culture of our magnificant yesterday and the coming [new] culture of the creative tomorrow. We are living, thinking and acting at the end of a brilliant six-hundred-year-long Sensate day. The oblique rays of the sun still illumine the glory of the passing epoch. But the light is fading, and in the deepening shadows it becomes more and more difficult to see clearly and to orient ourselves safely in the confusions of the twilight. The night of the transitory period begins to loom before us, with its nightmares, frightening shadows and heart trending horrors. Beyond it, however, the dawn of a new great culture is probably waiting to greet the men of the future."

Despite inimical criticism of this diagnosis by the gaudily optimistic 1920's, it turned out to be correct. So far history has supported my prognosis.

Since the transitional state of the present Euro-American culture largely determines its essential features, it is advisable to outline more precisely the nature of the present crisis. The main points are as follows:

It consists in a disintegration of the Sensate form of our culture, society and way of life, which has been dominant in the Western world during the last five centuries. The crisis involves all departments of Sensate culture and society. In this sense it is total, epochal and global.

Sensate Culture

THE Sensate form of culture and society is based upon the ultimate principle that true reality and value are *sensory*, and that there is no other reality and no real values beyond those that we can see, hear, touch, taste and smell.

The whole system of Sensate culture represents mainly an articulation and "materialization" of this ultimate principle in its science and philosophy, its religion, its law and ethics, its economics and politics, its fine arts and social institutions. This basic principle becomes also the main determinant of the values, aspirations and way of life of Sensate society. Consistent with this principle, Sensate culture makes the testimony of our senses the criterion on what is true and false. It cultivates scientific knowledge of the physical and biological properties of sensory reality intensively, and it is uncreative in the field of supersensory religion and theology.

Again, Sensate society is successful in technological invention aimed at increasing bodily comfort, but it is less successful in producing supersensory values. It favors the development of materialist, empiricist, positivist and other sensory philosophies, and it disfavors the cultivation of idealistic, mystical and metaphysical systems of philosophy. Despite lip-service to spiritual values, it stresses the sensory values of wealth, health, comfort, pleasure, power and fame. Its dominant ethic is invariably utilitarian and hedonistic. It views all ethical and legal precepts as man-made conventions, perfectly relative and changable. Its politics and economies are also decisively utilitarian and hedonistic. And as we shall see, its fine arts are marked by similar characteristics.

Sensate form emerged in Western culture at the end of the twelfth century; it subsequently grew and, after the fifteenth century, became dominant, supplanting the preceding religious or Ideational form which dominated the mediaeval period of Western culture from about the seventh to the thirteenth century.

Ideational Culture

THE Ideational culture and society of the Middle Ages were based upon the ultimate principle that the true reality and value are the supersensory and super-rational God and His Kingdom, as they are defined in the Christian Credo, while sensory reality and values are either false or sinful. Consistent with this principle, this culture believes in God's revelations as the criterion of truth, and disbelieves the testimony of the senses. Accordingly, Ideational culture cares little about scientific study of sensory phenomena or technological invention; since the sensory world is a mere mirage, it is a waste of time to investigate what is only the shadow of reality.

For this reason, Ideational culture is uncreative in the field of science and technology. In contrast, it concentrates its cognitive energy on a study of the Kingdom of God and a realization of its values. St. Augustine's *"Deum et animam scire cupio. Nihilne plus? Nihil ommino."* (I want to know God and soul. Nothing more? Absolutely nothing.) admirably expresses this property of Ideational culture. For this reason it is creative in the field of religion; theology becomes the queen of sciences and science only the handmaid of religion. Similarly, idealistic, mystical and supersen-

sory philosophies flourish, while materialistic, mechanistic, empiricist, positivist and other such philosophies have no success. This kind of culture views material and sensory values as sin and temptation; its verities and its ethical and legal precepts are regarded as God's revealed commandments, universal and unconditional in their truth and binding power. Its government is conspicuously theocratic, and spiritual authority has supremacy over secular power.

Finally, Sensate and Ideational cultures have entirely different types of fine arts, each created in accordance with the ultimate principle of the culture.

In accordance with its cultural principles, the topic of Ideational art is the supersensory Kingdom of God. It is religious art through and through. It pays little attention to the sensory world. Its object is not to entertain or give pleasure, but to bring the believer into a closer union with God. As such an art, it is sacred and does not admit any sensualism, satire, comedy, caricature, or anything extraneous to its nature. Its emotional tone is pious, ethereal and ascetic.

Its dominant style is symbolic. It is a visible or audible sign of the invisible or supersensory world of values. Since God and reality do not have specific material form, they cannot be perceived or depicted naturalistically; they can only be denoted symbolically. Immersed in an eternal transcendental world, Ideational art is static, hieratic, externally simple, even archaic. Being an art of the communion of the human soul with its God and itself, it does not need professional mediator-artists and is the creation of the anonymous collectivity of believers.

We all know that the supreme examples of mediaeval architecture are the great cathedrals. Their external form—cruciform foundation, dome or spire, and architectural details—are symbolic. Mediaeval sculpture, in turn, is entirely religious, and represents the Bible frozen in stone or wood. Mediaeval painting is a pictorial representation of religious doctrines; it is almost entirely symbolic and otherworldly. The same thing is true of mediaeval literature, music, and drama: all were created, as Theophilus said, "not for the love of human praising, neither for temporary profitable cupidity, but for augmenting the honor and glory of the name of God." In brief, mediaeval art was a truly great Ideational art.

In accordance with the ultimate principle of Sensate culture, on the other hand, its art moves entirely in the empirical world of the senses. Landscapes, genre, objects, events and adventures, and sensory values are its topics. The aim of Sensate art is to afford a refined sensual enjoyment, stimulation, and entertainment. For this reason it is sensational, passionate, pathetic, senuous and incessantly new. In its overripe phases, it is divorced from religion, morality, science, philosophy and other values, and calls itself "art for art's sake." It widely uses caricature, satire, comedy and farce.

Its style is naturalistic, visual, free from symbolism. It reproduces empirical phenomena realistically. It is dynamic in its very nature; it changes incessantly in a succession of fashions, because otherwise it becomes boring. It stands and falls by its appearance, like a glamor girl; to retain its charm, it makes lavish use of aids to beauty, stunning new techniques and clever and arresting innovations. It is an art of professional artists catering to a passive public, and, at its overripe stage, to the demands of the commercial market.

Integral Culture

ONCE in a while a third basic type of culture and fine arts, intermediary between the Sensate and the Ideational, emerges for a comparatively short time. Its ultimate principle proclaims that the true reality-value is an Infinite Manifold which has supersensory, rational and sensory forms inseparable from one another. This type of culture can be called *Integral.* It includes the empirical as well as the superempirical aspects of reality, science as well as philosophy and theology. Its fine arts are partly supersensory and partly empirical, but only in the noblest aspects of sensory reality. It is an art intentionally blind to everything vulgar, debasing and ugly in the empirical world of the senses. Its style is partly symbolic and allegoric, partly realistic and naturalistic. Its emotional tone is serene, calm and imperturbable. The artist here is merely *primus inter parea* of the community of which he is a member.

Each of these three types of culture has been realized several times throughout history: among pre-literate tribes, in ancient Egypt, Babylon, Iran, China, Greece and Rome, and in the Western world. In the life-history of Greco-Roman-Western culture and art, the dominant form from the ninth to the sixth century B.C. was Ideational; from the second half of the sixth to the end of the fourth century B.C. it was predominantly Integral; during subsequent centuries it became preeminently Sensate; after the third century A.D. it disintegrated into a mixture of different types until this eclecticism was replaced, after the sixth century by the Christian Ideational culture and fine art, which maintained its domination up to the end of the twelfth century.

At the end of the twelfth century this Ideational art and culture began to disintegrate and a new Sensate culture emerged and started to grow. In the thirteenth century these two currents met and produced the marvelous European Integral art of the thirteenth and fourteenth centuries. At the end of the fifteenth century the Sensate type of culture and most of the European fine arts (except music, whose Integral character maintained its slight domination almost to the nineteenth

century) became dominant and so continued until the end of the nineteenth century. During this period Sensate culture achieved unprecedented progress in science, technology, economics and politics, and created a vast treasury of magnificent masterpieces of Sensate music, painting, sculpture, literature and drama. However, at the end of the nineteenth century the culture began to show the symptoms of creative fatigue and disintegration.

The Explosion of War and Crime as a Result of the Disintegration of Sensate Order

IN the twentieth century, the magnificent Sensate house of Western man began to deteriorate. Its crumbling means, among other things, disintegration of its moral, legal, and other values which from within control and guide behavior of individuals and groups. When human beings cease to be controlled by deeply interiorized religious, ethical, aesthetic and other values, they become the victims of force and fraud as controlling factors of their relationships and destiny. In such conditions, man turns into a human animal driven mainly by his biological urges and passions. Unrestricted egotism (individual and collective) flares up, the competitive struggle for existence intensifies, and war, revolution, crime and other forms of interhuman strife explode on an unprecedented scale. So it was in all great transitory periods from one basic sociocultural order to another in the past, and so it has been in the present century, which has been the bloodiest of all the twenty-five centuries of Greco-Roman and Western history.

Engendered by the disintegration of Sensate order, these wars and crimes have in their turn greatly hastened this disintegration. It continues at the present time, and makes this process one of the three basic trends of our age. Fortunately for those societies which manage to survive, the distintegration process often generates the emergence and mobilization of the forces opposed to it. Weak and insignificant at the beginning, these forces slowly grow and begin not only to combat the disintegration but to build a new sociocultural order which can meet more adequately the challenge of the critical transition and the post-transitory future. This emergent process is slowly developing now. It makes the third basic trend of our time.

The epochal struggle between the progressively sterile and destructive forces of the dying Sensate order and the creative forces of the emerging, Integral sociocultural order marks all of today's cultural and social life, and deeply affects the ways of life of all of us.

The Epochal Struggle in Science

IN science this double process has manifested itself on the one hand, first, in an increasing destructiveness of morally irresponsible, Sensate scientific achievements like nuclear warfare, and second, in an increasing number of scientists who refuse to cooperate in this misuse of scientific creativity. The result has been the growth of scientific organizations like the Society for Social Responsibility in Science, and the beginning of a transformation of the basic theories of science in a morally responsible, Integral direction.

This change has already made today's science less materialistic, mechanistic and deterministic—or less Sensate—than it was during the preceding two centuries. Matter has become but a condensed form of energy which dematerializes into radiation. The material atom is already dissolved into more than thirty non-material "cryptic, arcane, perplexing, enigmatic and inscrutable" elementary particles: electron and anti-electron, proton and anti-proton, photon, mesons, etc., or into the "image" of waves which turn into waves of probability, waves of consciousness which our thought projects afar. These, like those associated with the propagation of light quanta, need no substratum in order to propagate in space-time; they undulate neither in fluid, nor in solid, nor in gas. Around a bend of quantum mechanics and at the foot of the electron ladder the basic notions of materialistic science such as matter, objective reality, time, space, causality, are no longer applicable, and the testimony of our senses largely loses its significance. The deterministic causality of the subatomic world is replaced by Heisenberg's principle of uncertainty, by fanciful "quantum jumps," or, in psychosocial phenomena, by "voluntaristic," free-willing laws of direction, or of immanent self-determination exempt from causality and chance. This last point is stressed by such leaders in the physical sciences as Max Planck, Einstein, Eddington, Schrödinger, Heisenberg, Margenau, Dirac, and many others.

Similar transformations have taken place in new theories of the biological, psychological and social sciences. Significant developments in these disciplines clearly show that the phenomena of life, organism, personality, mind and sociocultural processes are irreducible to, and cannot be understood as, purely materialistic, mechanistic and sensory realities. According to these theories they have, besides their empirical aspect, far more important rational and even supersensory and superrational aspects. The most modern science has already become notably Integral in comparison to that of the nineteenth century. This means an increasing replacement of the dying Sensate elements of science by the new Integral ones.

The Integral Conception of True and Total Reality

THIS replacement becomes clear if we take a few basic problems in physical, biological and social science, such as the problem of the true and

total reality. Sensate science in the past explicitly and implicitly tended to reduce this reality either to matter or to sensory experience. Such a science either denied or doubted the existence of any non-sensory reality. At present, this concept of reality is largely abandoned by science as too narrow and inadequate. Today the total reality is thought of as the infinite X of numberless qualities and quantities: spiritual and material, temporal and timeless, ever-changing and unchangeable, personal, spatial and spaceless, one and many. In this sense it is conceived as the veritable *coincidentia oppositorum, mysterium tremendum* and *fascinosum.* In its totality it cannot be adequately described or denoted by any words, signs or symbols which have evolved for the description and definition of the finite, the limited and the specific differentiations of the infinite and total reality-value. They can define some of the ripples of this ocean, but not the ocean itself, which contains all but is not identical with any or all of them. Even the most general categories of our thought, like substance, quantity, quality, relation, time, space, subject-object, cause-effect, being-becoming, can identify the ripples but are inadequate for definition of the total cosmic reality-value. J. S. Brigena's "God Himself does not know *what* He is because God is not *what,*" expresses this inadequacy of our terms and notions. Total reality is not identical with what or who, he, she or it, matter or spirit, subject or object, or with any of its differentiations, and at the same time it contains all of these and more. This explains why many have called it "the Unutterable," "the Inexpressible," "the Divine Nothing" into which fade all things and differentiations.

On the other hand, being ourselves one of its important aspects, we can grasp roughly some of its important modes of being. Three basic forms appear to be essential: a) empirical-sensory, b) rational-mindful, and c) superrational-supersensory. The new conception of reality does not deny its sensory form, but regards it as only one of the three main aspects. This new conception is incomparably richer than the old one, and is at the same time much nearer to the true and total reality of practically all great religions.

The Integral Theory of Cognition and Creativity

IN accordance with this trend, the scientific theory of cognition of the true reality has also changed. Though a few voices still intone John Locke's classical formula, *Nihil esse in intellectu quod non fuerit prius in sensu,* and its corollary that sensory perception and observation is the only means to scientific knowledge, this theory of cognition has become largely replaced by another theory closer to the new conception of reality. According to this new Integral theory of knowledge, we have not one but at least three different channels of cognition: sensory, rational and supersensory-superrational. The empirical aspect of total reality is perceived by us through our sense organs. The rational aspect of reality is comprehended by us mainly through our reason: mathematical and logical thought in all its forms. Finally, glimpses of the superrational-supersensory forms of reality are given to us by "intuition," "divine inspiration" or the "flash of enlightenment" of all creative geniuses: founders of great religions, sages, seers, prophets and teachers, scientists, philosophers, artists and leaders in all fields. These men unanimously testify the fact that their discoveries and creations have been inspired by intuition and then were developed and tested through the sensory and rational methods of cognition.

The Role of the Supraconscious in Discovery and Creativity

SINCE the supraconscious mode of cognition and creativity is still questioned by Sensate thinkers, who confuse it with the unconscious or subconscious, it is advisable to outline this problem briefly. The little that is known of the supraconscious may be summarized as follows:

First, the supraconscious seems to be the fountainhead of the greatest achievements and discoveries in all fields of human creative activity. Without its genius and operation, only mediocre achievements are possible. A man may know excellently all the rational rules and techniques entering into the composition of a literary or musical masterpiece, and yet, if he is devoid of the supraconscious genius, he never can become even remotely akin to the Shakespeares and Chaucers, the Bachs and Beethovens.

Second, the supraconscious creates and discovers through intuition. This is quite different from sensory perception or observation, and from logical, mathematical and syllogistic reasoning. As evidence: 1) Intuitional inspiration or cognition comes as a momentary flash, in contrast to patient sensory observation or mathematical, logical analysis. 2) The time and the circumstances of this flash can hardly be foreseen, predicted or voluntarily produced. 3) It often occurs in the least expected moment and conditions. This is true of groups as well as of individuals; the stream of creativity swells and dries, in an unpredictable and fairly erratic manner. 4) The flash illumines the most essential nature of the intuited phenomenon, relationship or value. 5) The supraconscious intuition lies at the basis of the whole sensory and logical knowledge or value experience. 6) The supraconscious is egoless: it transcends ego entirely and unconditionally. Dominated by the supraconscious, an individual becomes its instrument, lifted far above personal limitations. 7) The supraconscious has been long noted under different terms, such as the self (vs. ego), atman, pu-

rusha, eternal reason, no-knowledge, nous, grace of God, divine or mystic revelation, pneuma, the *docta ignorantia,* inner light, and others. Genius, inspiration, creative *elan,* the "sovereign intelligence which sees in a twinkle of an eye the truth of all things in contrast to vain knowledge," are still other descriptions.

Having outlined the essentials of the supraconscious, let us glance at the concrete evidence of its existence and operation.

The so-called "arithmetical prodigies" give an example of an operation of the supraconscious, quite different from conscious mathematical calculation. These persons, often of low intelligence and incapable *consciously* of mathematical reasoning, have been able to make instantaneously a complex calculation, like determining what factors would divide any large number, not a prime; thus given the number 17,861, they can say instantly that it is 337 x 53. When Vito Mangiamele (ten years old and otherwise uneducated) was asked the cubic root of 3,796,416, he replied, in about half a minute, 156. Among thirteen such prodigies we have two men (Ampere and Gauss) of eminent ability, and three rated good. The rest are of low or average intelligence. It is also to be noted that the gift lasted only a few years with most of them, and later disappeared. Whatever the nature of this gift, one thing is certain: it is something quite different from ordinary arithmetical calculation. Its operations are of the supraconscious kind, inexplicable and impossible otherwise.

In the main mathematical discoveries the role of the supraconscious intuition has been indispensable. Poincare, Birkhoff, Arago, and the whole Intuitional School in mathematics assert that "intuition and faith" serve as "the foundations for the rational superstructure erected by means of deductive and inductive reasoning," that they are "heuristically valuable," "of supreme importance," and "beyond reason."

Jacques Hadamard, himself a well-known mathematician, recently made a special study of the psychology of mathematical invention, using, among other sources, some eminent living mathematicians. All these men state that their discoveries were "sudden and spontaneous," "without any time for thought, however brief." They report experiences resembling Gauss's, who for many years fruitlessly struggled with a mathematical theorem. Finally, he reports, "I succeeded, not on account of my painful efforts, but by the grace of God. Like a sudden flash of lightning the riddle happened to be solved. I, myself, cannot say what was the conducting thread which connected what I previously knew with what made my success possible."

The supraconscious has played an equally important part in stimulating most of the important discoveries in science. Sir Isaac Newton's discoveries of the law of gravitation and of the composition of light are classical examples of great discoveries that were begun intuitionally. The same is true of those of Galileo, Haller, Black, Ampere, Liebig, Humphreys, Faraday, E. H. Moore, Planck, Davy, Berthelet, and others. In biology, the role of intuition was well stressed by C. Barnard. Eighty-three percent of 232 natural scientists queried by the American Chemical Society admitted an unpredictable flash of insight which solved their problems. It is not surprising, therefore, that a large number of great scientists, like Pascal, Kepler, Newton, Galileo, were not only intuitionists, but also mystics in the narrow sense of this term.

Philosophy also recognizes intuition, beginning with the Upanishads in India and Taoism in China, and passing through the mystic philosophies of the East and West—through Plato, Aristotle, the Neoplatonists, the Neo-Pythagorians and Gnostics, St. Augustine, Pseudo-Dionysius, J. S. Erigema, Nicolas of Cusa, and most of the great scholastics of the late Middle Ages. Even such apparent rationalists as Descartes and Spinoza, such skeptical-critical philosophers as Hume and Kant, not to mention Schopenhauer, Fichte, Schelling, Nietzsche, objective idealists like Hegel, and moderns like V. Solovyev, Tolstoi, Bergson, N. Lossky, W. James, Whitehead, Husserl and other "phenomenologists," N. Berdyaev, Kierkegaard, Maritain, and the Neo-Thomists, Scheler, Jaspers, Heidigger and some of the other Existentialists—these and many other philosophers recognize some sort of intuitional axioms, "forms of mind," or intuited truths as the basis of the mathematical, logical and sensory-observational verities in human cognition and creativity.

The supraconscious intuition plays perhaps a still more important role in technological inventions, a detailed study shows. In most inventions the first idea comes like a flash, unexpected, often in peculiar circumstances. "The veritable man of genius is he who acts by impulse. . . . And genius is a grace," as J. de Maistre sums up the situation in his excellent criticism of Bacon's *Novum Organum.*

Also decisive is the role of the supraconscious intuition in language, the fine arts, humanities, and social sciences. Language is certainly one of the greatest of human achievements. Since it is a condition of rational thought, it could not be invented consciously and rationally. Creation of all natural languages was largely supraconscious.

The principal philosophies, ethical systems, codes of law, and basic humanistic and social theories were formulated long ago, when neither laboratories, rational techniques, nor catalogues of observed facts existed. Only through supraconscious means could Plato have created his great

philosophical system, and the same may be said of other great philosophies of the past. The sublime ethical systems of the great religions were all formulated long ago, as spontaneous insights: notably, the Sermon on the Mount, and similar precepts of Taoism, Confucianism, the Upanishads, the Bhagavad Gita, yoga, Buddhism, Jainism, Judaism and Islam. All subsequent ethical theories and codes are but footnotes to these great ethical systems.

Nietzsche well describes the role of intuition. In the state of creative inspiration, he says, "one becomes nothing but a medium for supermighty influences. That which happens can only be termed revelation; that is to say, that suddenly, with unutterable certainty and delicacy, something becomes visible and audible and shakes and rends one to the depth of one's being . . . like lightning a thought flashes out, of necessity, complete in form."

Many great poets and musicians have similarly described the basic transmutation they experience when "inspired" or possessed by the supraconscious. "What, you ask, is my method in writing and elaborating my large and lumbering things?" writes Mozart. "I can, in fact, say nothing more about it than this: I do not know myself and can never find out. When I am in a particularly good condition . . . then the thoughts come to me in a rush, and best of all. Whence and how, I do not know and cannot learn." Beethoven states: "You will ask me where I get my ideas. I am not able to answer that question positively." And, clearly stressing the insufficiency of the rational mind for creativity: "The new and original is born of itself without one's thinking of it."

Similar statements have been made by most great writers. Schelling sums these up, saying, "Just as the man of destiny does not execute what he wills or intends, but what he is obliged to execute through an incomprehensible fate under whose influence he stands, so the artist . . . seems to stand under the influence of a power which . . . compells him to declare or represent things which he himself does not completely see through, and whose import is infinite."

Finally, the role of the supraconscious is overwhelmingly decisive in religious and moral creativity. Laotze, Zoroaster, Buddha, Moses and the Hebrew prophets, Mahavira, Christ, Mohammed, all the great teachers, explicitly profess this.

"I and the Father are one." (Jesus: John 10:30)

"Thou [God] art the doer thereof." (Jayminiya Upanishad)

"If any man is to come to God, he must be empty of all works and let God work alone." (John Tauler, *Following of Christ,* 16, 17)

"I live, yet no longer I, but Christ liveth in me." (St. Paul: Ga. 2:20)

"Not me, but God working through me." (St. Theresa)

"It is Thou who wanted my debut and who took my essence in order to serve Thee as a symbol among men." (Al Hallaj)

This idea is likewise stressed by mystics in the statement, oft-repeated, that the ego must die before one can reach union with God. We see here an extension of the transmutation of man into an instrument of the supraconscious which is to be observed in all fields of creativity. In religion and ethics this "becoming obsessed by the supraconscious" is especially conspicuous.

THESE are the essentials of what we know about the supraconscious. Its main function, seeming, is that of a stimulator and guide in discovery and creativity. In this capacity it cooperates with sensory and rational ways of knowing and creating, whose main functions seem to consist in developing and testing the illuminating idea granted by the supraconscious intuition. This means that each great human achievement is always the result of the unified work of all three—supraconscious, rational and sensory—ways of cognition and creativity. This fact warns us against acceptance of false "intuitions" as supraconscious insights. As a matter of fact, the grace of the latter in its full and pure form is visited upon only the few, and rarely at that.

The truth which is obtained through integral use of all these modes of knowing is fuller and greater than that achieved through one alone, be it either sensory perception, or logico-mathematical reasoning, or intuition. The history of human knowledge is a cemetery filled with wrong empirical observations, false reasonings, and pseudo-intuitions. In the integral use of all three, however, they supplement and balance one another. Integral cognition means that we learn about the total reality not only from empirical scientists and logical thinkers, but also from great religious and ethical leaders like Buddha, Jesus, Confucius and Lao-tze, and from the creative geniuses in the fine arts, like Beethoven and Mozart, Homer and Shakespeare, Phidias and Michelangelo.

For this reason, the new Integral theory is again more congenial to basic religious ideas than was the old Sensate theory of knowledge and creativeness.

The final portion of Dr. Sorokin's article will appear in the March issue.

Living Clocks

THE internal mechanisms whereby the processes of living creatures undergo orderly, rhythmic changes have been the subject of interest and speculation for many years. Plants, animals and man all exhibit this characteristic. These rhythmic phenomena are linked to lesser and greater geophysical cycles. Thus, the sleep movements of plant leaves and petals, emergence of flies from their pupal cases, color changes of the skin in crabs, and wakefulness in man are geared to the 24-hour solar-day cycle. The 24-hour and 50-minute lunar-day period of rotation of the earth relative to the moon is conspicuously linked to intertidal organisms, such as crabs and oysters, whose lives are dominated by the ocean's ebb and flow. The larger cycle of the synodic month, the interval of 29½ days, is quite precisely related to the menstrual cycle of the human being and the breeding rhythms of numerous marine organisms. And of course annual biological rhythms are so well known as scarcely to require mention.

The study of this periodicity in animals and plants was begun by Pfeffer in the first decade of this century, and has progressed steadily ever since. In an article entitled "Living Clocks," in the December 4, 1959 issue of *Science*, Frank A. Brown, Jr., who has long been identified with this research, summarizes the history of the study and reports the recent advances.

Early intensive studies of solar-day rhythmicality by Pfeffer resulted in two discoveries: first, the daily sleep rhythms of plants exhibit the capacity for synchronizations with external physical cycles (day-night) while having the cyclic phases experimentally altered by light changes at any desired time, and second, the daily recurring changes could deviate slightly from the natural solar-day periods. This seemed to indicate that the observed rhythmic periods could not be a simple direct consequence of any known or unknown geophysical fluctuation of the organism's physical environment. A third fundamental contribution was made by Kleinhoonte, who discovered that the daily sleep movements of plants could be induced to "follow" artificial cycles of light and dark ranging from about 18-hour to 30-hour "days." When the days deviated more than this from the natural solar-day period, the plants returned to their normal periodicity. As Brown says, "This observation clearly emphasized the very deep-seated character of the organismic daily rhythm."

In the light of his observations, Pfeffer concluded that the periods of plant rhythms must depend upon an independent internal timing mechanism. Although this hypothesis was contested for many years, later research, such as Binning's experiments in rhythmic variations under temperature changes, seemed to substantiate it. Research by Webb and Brown, first with temperature relations and later with the daily rhythms of special processes, such as color change, resulted in their formulation of a two-center hypothesis of rhythm timing, which has since been confirmed by others. Briefly, these studies showed that the rhythms of special processes were not the basic timers, and that these processes were being regulated by a more fundamental and relatively more stable underlying rhythmic component, showing that two serially coupled rhythmic centers were involved, one more basic, the other more labile. This discovery was important because it removed the basic timer from the observed physiological rhythms themselves, and it indicated that the organism possessed within itself a mechanism for generating regular periods of overt rhythms.

"The divorcing of the more basic cycles-timer from the observed rhythmic fluctuations of special physiological processes, and the demonstration that the observed rhythmic periods could deviate at least for several daily cycles from the exact period of the more basic timer, raised, of course, doubt as to what the actual period of the ultimate organismic timing center might be," Brown writes. "It also raised some question as to how faithfully the observed physiological periodicities normally reflect the period of such an ultimate timer.

"As long as the observed rhythms and the cycle-timer were generally conceded to be one and the same phenomenon, there was clear need for postulating an independent internal clock. However, despite the now widely conceded separation of the basic timer from the observed rhythmic process, Pfeffer's hypothesis of the presence of an autonomous clock is still retained by the majority of investigators. . . . This clock is considered to have a period reflected faithfully by the overt rhythms, once they have stabilized their period under constant conditions of light and temperature. This period is termed the 'free-running period,' and only under special circumstances is it exactly 24 hours. . . . In brief, it is postulated that the living organism possesses independent, cyclic biochemical systems with inherited natural periods of oscillation."

However, Brown points out, there are a number of problems in connection with this hypothesis of an independent "closed system" clock.

"Every attempt to characterize such a postulated endogenous clock in terms of our current concepts of possible underlying biophysical or biochemical schemes has emphasized the clock's independence of these schemes. In fact, even the site of the clock in the living thing has been similarly most elusive. It seems to be everywhere, and yet nowhere when we try to localize it."

In the face of these difficulties, there is increasing rational and experimental support for an alternative view, proposed long ago by Arrhenius: "the hypothesis that the clock comprises an 'open system' and that timing of the periods persisting in so-called constant conditions is derived through a continuous response of the living organism to its rhythmic geophysical environment." Evidence supports this view. "Oysters transported in light-proof containers from their habitat in New Haven harbor to pans of sea water in a photographic darkroom in Evanston, Ill., gradually rephased their rhythm of shell-opening over a 2-week period from the exact lunar-day time of high tide in New Haven harbor to the exact times of lunar zenith and nadir at Evanston, Ill., the theoretical time of high tide in Illinois were there a coastline." A program of study initiated about six years ago, which has considered metabolic fluctuations in a wide variety of organisms, has shown quite clearly that "all living things have continually imposed upon them from their environment metabolic rhythms of exactly the natural geophysical frequencies. . . . The phenomenon is universal among living things."

After discussing in detail the results of experiments with fiddler crabs and potatoes which confirm the above statement, Professor Brown writes, "Just as the time of the electric clock depends upon a synchronous motor with a continuous 60-cycle electrical imput, so, the evidence suggests, the timing of the living clocks depends upon a continuous inflow of cyclic information of the natural cosmic frequencies. Both clocks, furthermore, may be readily reset in their phases relative to the natural cycles without impairment of the capacity to time individual cycles accurately." In this "open-system" view, "the basic clocks are environmentally regulated and of the precise geophysical periods. The deviations of the observed periods of physiological rhythms under constant light and temperature become, instead of errors in a postulated internal clock, a splendidly adaptive means by which the organism gradually 'seeks out' the best fits to prevailing external daily cycles of light and temperature."

Professor Brown concludes his paper with the following statement: "The demonstration that all the natural geophysical periods are being derived from the physical environment by animals and plants even under conditions hitherto presumed to be constant, together with the clear evidence that organisms can use a rhythm of one frequency to derive a rhythm of a different one, eliminates the need for continuing to postulate autonomous internal clocks possessing all the natural periods. . . . On the other hand, such an environmentally dependent clock model as that presented here . . . readily accounts for the hitherto inexplicable immunities of the clocks to temperature changes and to drugs for all natural geophysical frequencies. . . . The present hypothesis reduces the remaining major problems to those upon which, perhaps significantly, most progress has already been made—namely, the mechanism of rhythm phasing. . . . This hypothesis also brings, for the first time, the mysterious living clocks out into the open, being far more amenable to investigation and analysis, in terms of our current knowledge in the natural sciences, than earlier 'closed system' clock hypotheses. . . . The unequivocal evidence at hand that organisms under so-called constant conditions are, indeed, directly deriving these natural periods renders it highly probable that the ultimate period-giver for all the observed persistent rhythms, from the sidereal day to the year, comprises simply a continuing reaction of the exogenously rhythmic living thing with its fluctuating physical environment."

—E. B. Sellon

The Ideological Detente

THE European edition of the *New York Herald Tribune* published on October 22, 1959 a report by Prof. Edward Shils of a meeting held in Rheinfelden, near Basel, under the auspices of the Congress for Cultural Freedom, with Raymond Aron as chairman.

Since this significant meeting was not reported in the American press, we reprint the report:

"In liberal intellectual circles in Europe and America, plain and simple anti-Communism has given place to the critique of ideology. The Congress for Cultural Freedom, in which some of these circles overlap, has, in the past few years, been canvassing the possibilities of a more civil approach to social and political philosophy, within the bounds of which both prudent conservatives and matter-of-fact radicals could find themselves at home."

It was as part of this program that the meeting was held. Those who came included Robert Oppenheimer, the American physicist; George Kennan, one-time American Ambassador to Moscow; Eugene Rostow, Dean of the Yale Law School; Bertrand de Jouvenel, the French writer and politician; Eric Voegelin, professor of social science at Munich University; Michael Polanyi, professor of social studies at Manchester University; Asoka Mehta, M. M. Postan, Charles Moraze, Jeanne Hersch and others, from many countries.

Professor Shils reports the meeting as follows:

"The problem was set by Aron in an opening paper dominated by a perplexing question: Is the ideological detente, which has already gone so far among intellectuals and politicians in the Western countries, likely to occur in the Soviet Union, both in its domestic public life and in its foreign relations? A corollary question was whether the industrialization of under-developed countries could occur without the ideological inflammation which attended the economic progress of the Communist countries, and from which the West is now convalescent.

"George Kennan declared that 'the long-term social goals and trends of Russian Communism lie along the same path as those of Western liberal industrialism.' The growing liberalization of Soviet society is, according to him, a product of the renascence of the Russian liberal tradition which had been crushed by Stalinism, which in its turn had been a function of its hard-driven program of rapid industrialization and of the accident of Stalin's personal ascendency.

"Most of the participants were willing enough to believe in the convergence of the Soviet and Western economic systems. (Prof. Polanyi spoke from an ingeniously original paper to demonstrate that behind the ideologically engendered veil of a planned economy, the fundamental mechanisms of the Soviet economy, and the reasons for its success, were much like those of the capitalistic and mixed economies of the West.)

"The political implications of Kennan's propositions were, however, generally rejected. Bertrand de Jouvenel pointed out that Western technological and industrial progress has been accompanied and indeed preceded by an institutional and ethical appreciation of individuality; there was, however, no reason to believe that once the path of industrial progress had been discovered in the West, it might not be reproduced elsewhere in the world without this ambiance. Prof. Postan corrected Kennan's failure to acknowledge the powerful Messianic element in the Russian revolutionary tradition. He saw no early extinction of dogmatic passion in the Soviet Union. As a matter of fact, he thought that once the Communist and Western economic regimes were abreast of each other, the deeper ideological and cultural dispositions of Russian Bolshevism would have an even great freedom to express themselves. The Soviet regime would become more, and not less, Promethean in its aspirations.

"A more direct confrontation with the Promethean element in Soviet ideology and with Messianism in particular led to no optimistic conclusion. According to Jakob Talmon of Jerusalem, the tenacity of the ideological, prophetic outlook which aspires to create a paradise on earth is unexpungible from any society which is inspired, however remotely, by the Hebraic-Christian tradition.

"Voegelin, after years of exile at the University of Louisiana, and who regarded all the other participants as themselves, in one way or another, the victims of the gnostic form of Messianism, asserted that if the ideology of the present-day Soviet elite were supplanted by something else, the replacement might be no less virulent.

"In a historically less grandiose manner, Aron suggested that the firm belief of many Soviet intellectuals that the proletariat, acting through the Communist party, really rules in the Soviet Union, offered little hope for truth-seeking dialogue. Moreover, the 'logic of the one-party system' as a machine for the self-perpetuation of dogmatic exclusiveness and for the deformation of truth might well prevent, for as far as could be foreseen into the future, the realization of any of those pluralistic tendencies which an industrial society necessarily arouses. In general, then, there was no optimism that identical levels of economic development would bring forth a common liberalism.

"Nor did the wisdom of India bring comfort to those for whom the good society is one without a passionately rigid commitment to a cause of cosmic scope. Asoka Mehta is a moderate man. He is an anti-Communist, he is a reasonable socialist and an exceptionally studious one. But India is trying to find a new pattern. Hence, he said, it can no longer, as any other new state in Asia or Africa can no longer, accept without question the Western democratic model. It must discover something to replace its broken traditions and to revitalize its stagnant society. The secular, civil politics of the anti-ideologists of the West, and the fanatical ideologists of the Communist world both seemed to him to be the affairs of another planet. Order is not enough. Efficiency is not enough. Industrialization is not enough. What is necessary is a new ideology, a 'spiritual approach,' an ignition of the soul by profoundly held beliefs.

"The intellectuals of the West have tired of the acerbity of ideological disputes. They are appalled by the cold war, and wish to see its end. They have foresworn many of the lifeless cliches which formerly divided them. They are satisfied with a mixed economy and they accept with loyalty and without enthusiasm the regime of representative institutions as long as they guarantee social justice and public liberties. They are, however, also a bit frightened by the society which they are affirming.

"The intellectuals of the West have been so long and so deeply involved in the ideological criticism of their own society that, as Mlle. Hersch said, they can find no middle ground between 'the bovine' and 'the messianic.' Even she did not venture an answer.

"Eugene Rostow, Dean of the Yale Law School, did. Piecemeal progress, the service of ideals, deliberately left vague, the dispersion and cooperation of many initiatives, an appreciation of all the values of the ordinary life were recommended. Such dull fare does not satisfy the demanding intellectual palate. The replies to Mlle. Hersch's question which evoked appreciation were those of the icily lofty American saints, Robert Oppenheimer and George Kennan.

"Their efforts to found the outlook of the post-ideological age could not, however, resist the appeal of a fictional past, romantically furnished with an organic world-view, a unified intellectual class, a sense of order, tragedy and dignity and standing in the sharpest contrast with our poor epoch, with 'all coherence gone.'

"Kennan's pharasaical portrait of American society, trivial, vulgar, populistic and directionless, and Oppenheimer's elegiacally mournful analysis of the evaporation of the ethical element from contemporary public discourse both gave voice to a wistful yearning for a new ideology, comprehensive and all-responsive, which would succeed the end of the ideological age."

—S. J. Aylmer

Sub-Cellular Organization

THE rapid development of new techniques of investigation and research, such as the art of particle fractionation and the use of the electron microscope, has made possible advances in the understanding of the fine-structure processes of biological functioning. In the field of biochemistry, an intensive investigation is being carried on concerning the biochemical and electrochemical processes and structures which underlie the activity of living cells.

Biochemists seem to fall into two groups, which might be characterized as tending toward "reductionist" or "organizationist" viewpoints. While regarding a certain amount of biological organization as inescapable, the reductionist views this as epiphenomenal, and seeks to interpret phenomena in terms of the basic, predetermined interactions of the elementary particles of physics and chemistry.

The attitudinal opposite of the reductionist is the investigator who feels that the characteristics of an *organized* life-form are *not* deductible from its component elementary particles, and seeks instead for clues to these emergent characteristics in the *organized structure* of the life-form, even at the level of sub-cellular activities and processes. Evidence of organization of enzymes is discussed in an article entitled "Enzymes and Biological Organization" by David E. Green and Johan Järnefelt, which appears in *Perspectives in Biology and Medicine,* Winter 1959 issue. The article begins:

"One of the cornerstones of contemporary biochemical thinking is the concept of the individual enzyme as the unit of enzymatic action. According to this view, every biochemical reaction is catalyzed by a specific enzyme; and all multi-step processes can be accounted for by the collaboration of a group of discrete, specific enzymes. . . . Any number of examples appear to vindicate fully these working assumptions . . . [and] . . . the thesis that certain multienzyme processes are merely the sum of the individual enzymatic reactions.

"By contrast, this approach has utterly failed when applied to enzymatic processes which are intimately bound up with the sub-cellular structure. Processes such as electron-transport, oxidative phosphorylation, and photosynthesis have been found to be wedded to mitochondrial or chloroplast structure, and it has not been possible to deal with these processes by classical methods. . . . If the concept of biological organization at the level of enzymes is accepted as a general rule, this disturbing dichotomy automatically disappears."

The author states: "The evidence drawn from studies in several laboratories was unequivocal that the mitochondrion, from whatever source, shows a distinct pattern of organization in the interior as well as in the limiting membrane (or envelope). . . . Electron microscopy has produced evidence of such extensive intramitochondrial organization . . . that the presence of any major amount of unorganized components can be seriously doubted, if not excluded."

In this brief abstract, it is not possible to give the many specific reactions cited by the authors. Excerpts from their closing paragraphs point up the main argument: "The article affirms the concept that all intracellular enzymes are built into specific and precise structures and that their function depends to a large extent on organization. . . . Lipoproteins probably constitute important structural and functional links between the components of the system. Although many of the phenomena of electron transport are still unexplained, there remains no doubt in our mind that the precise structural arrangement of the components of the system has to be invoked in any explanation of these functions. Similar lines of thought have been expressed by Weber regarding muscular contraction, and probably many other highly complex biological phenomena will be explained biochemically in terms of specific organization. The recent studies of Palade and Siekevitz on the elaborate mechanism in the pancreas for the synthesis and release of amylase—a mechanism entirely dependent on a highly organized arrangement of enzymes and macromolecules—may portend things to come."

—Alan Mannion

NEWS AND NOTES

AFTER the first and second World Wars the military victors assisted in promoting the economic recovery of their adversaries. After any future World War there will be no victors, only the vanquished. For it seems that top command posts in nuclear-armed countries, especially Russia and the United States, operate automatically upon a certain high level of radiation intensity, and thus ruin will be quite general. Only the countries which are absolute non-participants in the bombing will be in a position to rebuild others. For this reason World Wars are impractical. They also pitch whole populations into vertable hell, if not extinction. This is all so widely known that only an act of madness or a failure in military or political information could lead to such a holocaust.

Strange to say, therefore, the very real and present danger which faces us today derives from the threatened outbreak of *peace*. This fact is also well-known, and we are lending money right and left in an effort to prepare the world economy for such a contingency. But suppose peace comes upon us almost at once? In the United States at least a severe dislocation would almost certainly follow upon total disarmament. What would we do with the enormous sums we now spend upon war—past, present and future?

As of today the economic process cannot be carried on in terms of common sense, humanity and simple prudence. With peace assured, it can and will be; these three considerations will become our conscious goals. But as of now, the nation is afflicted with an economic malaise. In 1960 we shall spend far more than a billion dollars merely to store and pay interest on the sums spent for surplus grains and other crops. The Dutch have stored excess butter and the Chinese mountains of extra cabbages, but no nation can match us for wholehearted persistence in this folly.

The steel strike, just settled so astonishingly under pressure from the executive, after months of fruitless negotiation, emphasizes how false are the bases upon which our labor-management relations rest. The transportation snarl disjoints the nation; railroad facilities deteriorate under one's eyes while just-completed highways prove themselves immediately inadequate. Air travel produces all sorts of unsolved problems: air lane control and supervision, and the need for ever-greater terminals near cities, with the consequent destruction of large areas of farm- and home-land. Relocation of population, the tremendous withdrawal from rural to urban areas which then become sprawling megalopolises, unplanned, uncomfortable, unbeautiful—all these cause problems of housing, schooling, transportation and communication which need courageous and original thinking. Instead, there is the overlapping of authority which results in stalemate, the spectacle of jockeying for position and power, recrimination and mutual abuse by persons in authority, and, as a result of all this, the failure to adjust our enormous economic complex to the day-by-day changes which our times require.

World peace would add to this load of already unmanageable cross-stresses a duty to make vast additional changes, so far-reaching that we are simply not prepared even to think about them, much less plan wisely. If we are failing to create a sound economic policy which will realistically and humanistically control rising prices, distribution of buying power, and an explosive public debt, how shall we act if world peace becomes, suddenly, a reality rather than an airy dream? It is obvious that a tremendous adjustment of the economy will be called for, or else the system will suffer a shock so massive as to make 1929 seem a mere tremor by comparison.

The economic and political implications of this strange state of affairs are too extensive to be set forth here. But it should be said that part of our inability to visualize its dimensions comes from the fact that none of the agencies of public information—be they newspapers, magazines, radio or television stations—have any conviction of their duty to provide the country with the facts it needs to sustain an honest, well-informed discussion of the problem.

Why are the American people thus disfranchised?

The voter can get a fairly shrewd idea of the political thinking of candidates for office. He can assess a man's social attitudes pretty well. But what of the really critical problems noted above? They are scarcely touched upon because even the most honest candidate himself does not have the information needed to assess them. Where would a Senator turn to get the facts if he intended to write legislation designed to launch a peacetime economy that would be both rational and humane?

We are a nation of illiterates in the field where politics, economics and social forces meet and interlock. The Founding Fathers set up a magnificent system, but it is now slowly decaying from within. Congressional committees have usurped court functions. The Executive is constantly legislating through agencies. Human rights, guaranteed to citizens by the Congress, and part of the Constitution, can only be obtained by appeal to the Supreme Court. None of this, of course, is the fault of the Founding Fathers. But it imposes upon us a duty to view our machinery of government afresh, in the context of those technological

advances which have changed our nation so drastically, and which now make world peace inevitable.

The only hope that we have of achieving this clearer view is through education; specifically through the schools, and generally through truthful, thorough, thoughtful public information.

Modern education has been far too limited: to literateness as an end in itself, to technical competence without regard for the purposes of technology, to social adjustment without evaluation of society's meaning and structure. The materials, not the meanings, of knowledge have been our concern; therefore our education has not produced that deep stirring of individual courage, that true intellectual honesty, that philosophical insight and creative originality which, if evoked, can provide our ailing society with the individuals who will revivify it. A healthy economy must be a natural growth, rooted internally upon the values of freedom and justice, and nurturing human needs. The values as well as the needs must be the shared concern of all, and this can only be achieved through education.

Elsewhere in this issue is an account of another of the many efforts (this time in Basel) made by scientists and philosophers to organize a start on the development of an ideology. Once more the fundamental mournful note of frustration and hopelessness is heard. Once more the cause is the same: a failure to work out first of all the method, the epistemology. This is what defeated the Conference on Science, Philosophy and Religion in Their Relation to the Democratic Way of Life, Inc., between 1940 and 1942—and what has defeated every other effort observed by the present writer since the need for a new consensus became clear in the nineteen-thirties. This defeat need not be experienced again; and it is high time that ministries and governments, funds and foundations, industries and banks, schools and colleges, professional associations and other great organizations began to take this matter seriously. If they don't, peace will be here, and then it will be too late.

For our dilemma, of course, is that until the peace comes the money needed for such an education is committed to war preparation; when the money is finally freed, the crisis will already be upon us. Hence the duty of teachers to "raise the standard to which honest men can repair." The ethical breakdown of our times is such that one cannot hope that the standards which have been so lowered through vulgar, dishonest and specious advertising can be raised by the very agencies of communication which have fostered the lapse. It is only the educational institutions which can, at all levels, gradually reestablish in the American people a sense of the relevance of their own personal lives and habits to the national, to the universal, good. Through education, men can root themselves in the orders of nature; then, convinced of their meaningful place in the cosmos, they can find the courage to create the social, economic and political changes, which the times demand, by "open covenants, openly arrived at."

Such a broad educational program can function in any free country, since science will lend its force to these ends. So that herein we could have a development which would not only strengthen us internally, but would tend to unite all free nations for peace.

—*F. L. Kunz*

REVIEWS

Cosmological Concerns

NE aspect of the continuing discussion of the meaning of the new physics turns upon this issue: can inertia be explained as a function of the amount of matter in the universe? That is to say, is the universe linked mechanically (as Mach held) as well as optically (i.e., electromagnetically)? Whether the answer be yes or no, the issue then resolves itself into this: How do the properties of space (as space-time) enter into the operation?

A remarkably simple and well-illustrated book is now available for those who care to examine the data: *The Unity of the Universe,* by D. W. Sciama (Doubleday, New York, 1959, 220 pp. and index, $3.95).

The author, a sometime Fellow of Trinity College, Cambridge, and a student of the well-known astronomer, Fred Hoyle, is concerned to supply in words, diagrams and photographs all the essentials needed to convince the general reader that today we cannot and need not endure what might be called the state of mental inertia in Mach about "the nature of the coupling between the stars and local matter which is supposed to give rise to inertial effects." (p. 118) (A state, incidentally which in Newton became a natural acceptance of wonderment.) In short, how does space deliver the inter-related forces of the cosmos?

After a most lucid re-examination of the factors in the problem, Dr. Sciama concludes:

"We do not yet know how to construct such a theory [of the universe] or any other rigid theory for that matter, but I strongly suspect that to do so we shall need to exploit the unity of the universe. For only if the different parts of the universe are

related in theory can we expect to account for the actual relations that are observed in practice. In this way our two main themes become linked together.

"A possible linkage of this sort has been suggested by Bondi and Gold. They begin by making the obvious point that the large-scale behavior of the universe depends on the laws of motion. They then add that, owing to the unity of the universe, the laws of motion depend on its large-scale behavior. Such a self-linked system may lead to only one possibility for the universe, since it faces serious problems of self-consistency. Suppose, for example, we were to adopt some particular model for the universe. Owing to the unity of the universe, this would have certain implications for the laws of motion, which in no turn would restrict the large-scale behavior of the universe. Now these restrictions may be inconsistent with the model that was originally adopted, in which case this model is ruled out. Bondi and Gold suggested that the requirement of self-consistency might be so severe as to permit only one model of the universe. If they are right, the unity and the uniqueness of the universe are linked together in the most intimate way, the universe itself being the sole self-perpetuating consequence of its long-range interactions. The discovery of all these interactions, and the establishment of their unique significance, would be a fitting climax to man's long struggle to understand the universe."

Here is another example of the documentation by modern physics of the insights of sages. The Hindu *manvantara,* a given, *unique* system of cosmic evolution, was conceived to be followed by a state of maximum entropy (*pralaya,* or condition before, and without, particles or places). In the Western tradition we read that it is the heavens which declare and furnish the glory, i.e., emit the radiation, when the Word is called and light is let forth. But it is in the firmament of the nebular systems that we are able to scrutinize the handiwork. Whether it be East or West, the old doctrine is like the new one, and a book like this adds substance to the integrity the modern mind so sorely needs for its philosophical vitality.

—*F. L. Kunz*

The Changing Values of Modern Physics

AT a time when the daily newspapers are announcing fresh discoveries in the sciences with each new edition, the non-specialist reader may easily get lost in a maze of technical terminology, and feel the need for some touchstone to help him understand the work of today's scientists and research teams. The "cultural lag" — the absorption interval between the announcement of a new concept, and the appearance of the new conception as a modifying factor within the culture itself — is of course becoming shorter and shorter. Gunpowder and the compass were known for centuries before they produced much cultural change, but it is less than twenty years since the first successful experiment in atomic fission, and no one can deny that his world and his life have been profoundly changed thereby.

For the average intelligent layman, the field of theoretical physics has remained an exotic land out of which come strange and wonderful new ideas and observations, having the power to change his life and his thinking, but beyond his power of meaningful interpretation. To such a reader, *Turning Points in Physics* (Interscience Publishers, Inc., N. Y., 1959, 192 pp., $3.50) will come as a welcome surprise, and a challenge. The volume contains the text of a series of six lectures organized by the Reader in the Philosophy of Science and the Lecturer in the History of Science in the University of Oxford.

The talks were given by senior members of the University to an audience composed mainly of philosophers and scientists *who were not physicists.* The non-technical presentation keeps the volume within the comprehension of most interested laymen. From the Introduction by A. C. Crombie, (Lecturer in the History of Science at Oxford), through the six chapters, each by a senior member of the University in the fields of either Physics or Natural Philosophy, there is a careful, cumulative development of idea, a gradual clarification of the *direction* of search. The slight differences of personal writing style of the several authors serve to emphasize and ornament the book's finely integrated content. The sequence of ideas is logical, and follows generally the history of their development and importance.

In the scope of this volume, a "turning point" in physics is regarded not strictly in terms of new observations or experimental evidence, but rather in terms of key ideas which present us with new ways of regarding the universe and which in time become new assumptions about man and his place in, and relation to, his universe. Physical theory after Faraday saw a succession of similar re-appraisals of the assumptions that could be considered acceptable, of special importance being those associated with the introduction of probability into physics and with the atomic theory, radioactivity, quantum theory, and relativity. In all these cases the presuppositions made by physicists about the world and about the scope of physics served, as with Faraday, on the one hand to regulate the form it was held that an explanation must take, and on the other to direct attention and stimulate scientific imagination in particular directions. Sometimes bold new assumptions forced the change; sometimes new experimental evidence necessitated a fresh viewpoint. The resulting interplay between assumptions, theories, and experimental discoveries is the main subject of the volume.

The first chapter is entitled: "The End of Mechanistic Philosophy and the Rise of Field Physics," by R. J. Blin-Stoyle, Senior Research Officer in Theoretical Physics, Oxford University. It describes how the concept of fields was introduced by Faraday and Maxwell. The author hails the field theory because it enabled two completely different branches of physics, optics and electromagnetism, to be described in terms of the same theory. He writes: "Initially the field description of phenomena was introduced as a means to understanding the mechanical description of nature. However, as it became clear that it was a description of the field, rather than its sources, that was essential for a complete understanding of the behavior of the sources, it was realized that a new concept was arising for which there was no place in the old mechanistic philosophy." We may assume

that all such statements as this one, throughout the book, are historically accurate and unimpeachable. But one wishes that the writers had been as alert to point out more of the necessary new assumptions as they are to demolish the old mechanistic descriptions. Since fields are themselves entirely non-material, and since, having command-power over physical matter, they are unquestionably real, it seems to this writer that pointing out the *reality of the non-material* would emphasize for the reader the magnitude of this "turning point in physics" and the qualitative difference of many of the new assumptions.

Contemporary theoretical physicists will of course differ somewhat as to interpretation of details but in general the *direction* of the "new outlook" in physical theory is fairly well established. When we attempt to look ahead, we may be struck by how differently we see the world, the universe, from the way it appeared to us even a quarter-century ago. Since they concern man, and his relation to his world, these views are more significant than, say, mere enumeration of the many new "particles" now recognized by the physicist.

The second, third and fifth chapters describe the changes in outlook brought about by the advent of quantum mechanics. These incorporate a change in the concepts of probability, causality and determinism, as well as the idea of quantization. The fourth lecture deals with relativity, and the last lecture describes the galaxy of so-called elementary particles just referred to. The list of these particles, which is still increasing, might lead us to suspect that we were again favoring a mechanistic interpretation of our subject, but in each case it is shown that the particle results from the quantization of a field.

Not merely in physics, but in all "scientific disciplines" it is becoming increasingly evident that any single description of an object is only partial. In most disciplines it is recognized that at least two descriptions are needed; and these might be termed the "dimensional" description and the "dynamic" (or "energetic") description. Neither purports to be the whole description, nor are they mutually contradictory or mutually exclusive. They should be regarded rather as complementary descriptions, both of which are necessary to a full, rounded and "realistic" appraisal.

This state of complementary exists, for instance, between the "particle aspect" and the "wave aspect" of matter on the sub-atomic level, and of energy in the electromagnetic spectrum, such as visible light. (In the case of light, Aristotelian armies fought many bloody battles to determine whether light was *either* "particle" *or* "wave," but today the concept "wavicle" unites these complements under the non-Aristotelian, relativistic banner "and/or".)

Part of the difficulty in the wave-particle battle is a semantic one. In the final chapter of *Turning Points in Physics,* Professor D. M. Wilkinson reminds us that our discussion of the physical world is dominated by our own point of view. We understand best (and describe best) those systems or phenomena which are roughly on the same scale in space and time as ourselves. Our language has been evolved to do just this, since these are the only phenomena we can directly perceive and appreciate, with our unaided senses. "Language is a household invention," he writes, "and we must not expect it to be applicable very far beyond the confines of household experience. The laws of physics of bodies of household size can be fairly well expressed using words of household origin. . . . But take another step downwards in size . . . say to 10^{-6} cm and we are in a region where no refinement of our own senses can help us. . . . In *talking* of the sub-microscopic world we are never doing any more than employing analogies which may or may not be useful, and which may or may not be misleading. Such descriptions may either break down completely, or involve the simultaneous use of terms which, in the *larger world* of our direct experience, are mutually exclusive."

All six authors exercise unusual care in attempting to avoid such semantic clouding. The book is a guided tour of the development of physical theory during the critical years since the abandonment of mechanistic hypotheses. The exposition is clear and the development logical.

—Alan Mannion

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